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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/797,925	03/10/2004	Andreas Lopp	SANZ-253	3357

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FULBRIGHT & JAWORSKI, LLP
666 FIFTH AVE
NEW YORK, NY 10103-3198

EXAMINER	
BAND, MICHAEL A	

ART UNIT	PAPER NUMBER
1795	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/797,925	LOPP ET AL.	
	Examiner	Art Unit	
	MICHAEL BAND	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 December 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *12 July 2007* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-7, 9-15, and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morrison, Jr. (US Patent No. 4,461,688) in view of Lehan (WO 96/21750) and Hughes et al (US Patent No. 5,873,989).

With respect to claim 1, Morrison discloses a magnetron and target (abstract, lines 1-2; fig. 5, [12]) with the magnetron comprising a magnet system with at least one inner magnet and at least one outer magnet (fig. 5, [46'], [52']). This magnet system forms at least one closed plasma tube (i.e. plasma loop or plasma path) between an inner and outer magnet (abstract, lines 10-14 and lines 19-20). Between the inner and outer magnets, there exist two regions at a distance (i.e. C) from one another as evidenced by the space between either S and N poles or N and N poles (fig 5). However Morrison is limited in that there is no description or illustration to display the shape of the plasma tube.

Lehan displays a plasma racetrack (i.e. tube) (fig. 2B) schematically similar in design to applicant with dimensions "W_L" (i.e. "d") and "D_P" (i.e. "B"/2). This type of design reduces erosion of a target at the end portions while the magnetic field at the

ends need not be significantly reduced, leading to maintained efficiency of magnetron (abstract).

It would have been obvious to one of ordinary skill in the art to use the plasma racetrack taught in Lehan as the plasma tube in Morrison in order to gain the advantages of reduced erosion of the end portions of target while not reducing the magnetic field and thus, maintaining magnetron efficiency and one of ordinary skill would have a reasonable expectation of success in making such a modification.

However modified Morrison is further limited in that the magnets do not move linearly over the target.

Hughes et al teaches a sputtering magnetron contained inside a vacuum chamber capable of moving linearly across a target at a distance (i.e. W) and utilizing a plasma tube. The abstract discloses "a magnet assembly disposed in proximity of the target" (abstract, lines 3-4) and "a drive assembly for scanning (i.e. moving) the magnet assembly relative to the target" (abstract, lines 5-6) in order for the magnet to sputter more of the target area.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a moving magnetron relative to target and plasma race-track taught in Hughes et al as part of the sputtering magnetron apparatus in Morrison '688 in order to gain the advantages of increased efficiency in uniform erosion of the target well known in the art and one of ordinary skill in the art would have a reasonable expectation of success in making such a modification.

With respect to claim 2, Morrison discloses a magnetron and target (abstract, lines 1-2; fig. 5, [12]) with the magnetron comprising a magnet system with at least one inner magnet and at least one outer magnet (fig. 5, [46'], [52']). This magnet system forms at least one closed plasma tube (i.e. plasma loop or plasma path) between an inner and outer magnet (abstract, lines 10-14 and lines 19-20). Between the inner and outer magnets, there exist two regions at a distance (i.e. C) from one another as evidenced by the space between either S and N poles or N and N poles (fig. 5). However Morrison is limited in that there is no description or illustration to display the shape of the plasma tube.

Lehan displays a plasma racetrack (i.e. tube) (fig. 2B) schematically similar in design to applicant with dimensions "W_L" (i.e. "d") and "D_P" (i.e. "B"/2). This type of design reduces erosion of a target at the end portions while the magnetic field at the ends need not be significantly reduced, leading to maintained efficiency of magnetron (abstract). Since "B" was obviously less than "d" as discussed, "B" greater than or equal to "2d" must hold true if both "B" and "d" are greater than one.

It would have been obvious to one of ordinary skill in the art to use the plasma racetrack taught in Lehan as the plasma tube in Morrison in order to gain the advantages of reduced erosion of the end portions of target while not reducing the magnetic field and thus, maintaining magnetron efficiency and one of ordinary skill would have a reasonable expectation of success in making such a modification.

However modified Morrison is further limited in that the magnets do not move over the target.

Hughes et al teaches a sputtering magnetron contained inside a vacuum chamber capable of moving linearly across a target at a distance (i.e. W) and utilizing a plasma tube. The abstract discloses "a magnet assembly disposed in proximity of the target" (abstract, lines 3-4) and "a drive assembly for scanning (i.e. moving) the magnet assembly relative to the target" (abstract, lines 5-6) in order for the magnet to sputter more of the target area.

It would have been obvious to one of ordinary skill in the art at the time of the invention to use a moving magnetron relative to target and plasma race-track taught in Hughes et al as part of the sputtering magnetron apparatus in Morrison in order to gain the advantages of increased efficiency in uniform erosion of the target well known in the art and one of ordinary skill in the art would have a reasonable expectation of success in making such a modification.

With respect to claims 3 and 11, modified Morrison further discloses fig. 11 having magnetic fields A and B. In between A and B, two significantly smaller fields are seen. There exists a certain distance between parts [120]/[132] and parts [108]/[130] (i.e. distance C) that separates the two. The horizontal midpoint of each white space between parts [120]/[132] and parts [108]/[130] represents the endpoints of the certain distance (i.e. distance C). According to the drawing, the magnetic fields present in fig. 11 are similar to the fields depicted in the application drawings. In fig. 11 it appears that at either contrived endpoint, the component of the magnetic field perpendicular to the surface of the target is zero.

With respect to claims 4 and 12, modified Morrison further discloses fig. 11 that has smaller magnetic fields between magnetic fields A and B, forming a semi-oval from the points at which the smaller magnetic fields intersect the target. Fig. 3 displays prior art with a schematically similar magnetic arrangement as that of Morrison. The acute angle present is 45°. However Morrison is limited in that fig. 3 displays an angle of 45°, while applicant claims an angle of 20°.

It has been held that where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984).

Therefore it would have been obvious to one of ordinary skill in the art to have the magnetic field form a plurality of angles, including 20° and 45°, and one of ordinary skill would have a reasonable expectation of success in making the modification.

With respect to claims 5 and 13, modified Morrison further discloses a "closed plasma loop" (abstract; col. 7, lines 61-68; col. 8, lines 1-9) that is schematically similar to the plasma tube described by application. From fig. 11, the smaller magnetic fields between magnetic fields A and B, a semi-oval is formed from the points at which the smaller magnetic fields intersect the target. The angles formed from these intersections are acute angles. Fig. 2 in Morrison displays the magnetic field forming an angle of 45°

with that of the target. However modified Morrison is limited in that figure 2 displays an angle of 45°, while applicant claims an angle of 20°.

It has been held that where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984).

Therefore it would have been obvious to one of ordinary skill in the art to have the magnetic field form a plurality of angles, including 20° and 45°, and one of ordinary skill would have a reasonable expectation of success in making the modification.

With respect to claims 6 and 14, Hughes et al further discloses that the magnet assembly that "is linearly scanned (i.e. moved) by the drive assembly along a scan direction relative to target" (col. 3, lines 1-2). "The magnet assembly is scanned with a reciprocating linear movement and changes direction at or near opposite edges of the target" (col. 5, 63-65).

With respect to claims 7 and 15, modified Morrison further discloses fig. 10 which has a long bar magnet on the outsides (fig. 10, [108], [120]) with a short magnet at the ends (fig. 10, [110], [112], [122], [124]) as a "roof". A smaller bar magnet is on the inside (fig. 10, [130], [132]). The closed plasma loops run between the smaller bar magnets and the long bar magnets with "roofs" as evidenced by fig. 11.

With respect to claims 9 and 17, modified Morrison further depicts fig. 11 having similar types of magnets (i.e. small and long magnets) that form two distinct outer regions, with one part of the first region composing the second region and vice versa. The two regions also have an inner magnet with the outer boundary being composed of an arrangement of long and short magnet bars. Morrison further depicts fig. 13 having a comparable shape with the plasma tubes sharing a boundary that separates the two tubes. However modified Morrison is limited in that the magnets only contain 2 tubes instead of 3 tubes.

Although the reference does not disclose three tubes, it has been held that the mere duplication of parts has no patentable significance unless a new and unexpected result is produced. *In re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960).

Therefore it would have been obvious to one of ordinary skill in the art to duplicate the closed plasma loop any number of times in order to increase efficiency in uniform target erosion, increase film uniformity thickness onto substrate, increase overall target area sputtered, and decrease overall amount of sputtering time needed per substrate and one of ordinary skill would have a reasonable expectation of success in making the modification.

With respect to claims 10 and 18, modified Morrison further depicts fig. 10 having the outer magnets (fig. 10, [108], [114], [116], [120], [126], [128]) as all being parallel, with parts [114], [116], [126], [128] being shorter than parts [108] and [120]. Fig. 10 further depicts that the ends of the two magnets are connected with one another by an L-form magnet configuration, for example, figure 10, parts [126] and [122].

3. Claims 8 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Morrison, Jr. (US Patent No. 4,461,688), Lehan (WO 96/21750), and Hughes et al (US Patent No. 5,873,989) as applied to claims 7 and 15 above, and further in view of Tsukasa (JP No. 10088339).

With respect to claims 8 and 16, the references are cited as discussed for claims 1, 2, 7 and 15. Modified Morrison depicts fig. 10 as having the inner magnet a prism shape. However modified Morrison is limited in that the entire inner magnet is of a uniform length and width instead of having a smaller diameter at its ends than its center.

Tsukasa teaches an inner magnet [70] that has a smaller diameter at the point than in the center. The inside magnet is rectangular until reference point A1, at which the magnet becomes smaller than the center part. This enhances the availability of a target "by making the cross-sectional area of erosion in the vicinity of both edge parts in the longitudinal direction not larger than the cross-sectional area of erosion in the center part in the longitudinal direction in the cross-sectional area of erosion in the reciprocating direction of a magnet unit" (abstract).

It would have been obvious to one of ordinary skill in the art to use the inner magnets taught in Tsukasa as the inner magnet for the plasma track in Morrison in order to gain the advantage of improved availability of a target well known in the art and one of ordinary skill would have a reasonable expectation of success in making such a modification.

Response to Arguments

Drawing Objections

4. The Applicant has amended the claims to no longer require part [W]; the objection is withdrawn.

103 Rejections

5. Applicant's arguments filed 12/2/2008 have been fully considered but they are not persuasive.

6. On p. 6-7, the Applicant argues that Morrison fails to teach the claimed limitation of a distance C in addition to other regions at a distance of C. The Applicant also argues that Lehan et al relates to non-analogous art compared with Morrison.

The Examiner, again, respectfully disagrees. With regards to the limitations of C, the Examiner has admitted that while Morrison depicts in fig. 5 an inner magnet [52'] and an outer magnet [46'], Morrison does not disclose a description or illustration to display the shape of the plasma tube (i.e. C). However the Examiner has combined Morrison with Lehan et al since Lehan et al teaches a plasma racetrack (i.e. tube) similar to one that would be formed by Morrison and both references teach using outer and inner magnets. The Examiner admits that Lehan et al and Morrison teach different magnetrons, however both teach having a plasma tube or racetrack, thus it is obvious to one of ordinary skill in the art that the plasma racetrack parameters as specified by Lehan et al are applicable to the plasma tube of Morrison.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Band whose telephone number is (571) 272-9815. The examiner can normally be reached on Mon-Fri,9am-5pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on (571) 272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

9. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/M. B./

Examiner, Art Unit 1795

/Alexa D. Neckel/

Supervisory Patent Examiner, Art Unit 1795